Exhibit 1

Steven B. Bird, MD
[redacted]

July 15, 2014

Danny Onorato
Schertler & Onorato, L.L.P.
[redacted]

Dear Mr. Onorato

I will begin my report by briefly summarizing the details of the case, then analyze and discuss the relevant issues and render my opinions. My opinions are based on my knowledge, experience and training in the fields of emergency medicine and medical toxicology, and a review of the records. They are subject to revision should further information become available.

BACKGROUND AND QUALIFICATIONS

I earned my Bachelor of Science degree in biology *cum laude* in 1991 from Yale University, where I was named a Yale University Richter Fellow. I worked in the laboratory of Professor Sydney Altman, Dean of Yale College and winner of the 1989 Nobel Prize in Chemistry. I was awarded my Doctor of Medicine degree by Northwestern University in 1995 and was also elected to the *Alpha Omega Alpha* national medical honor society (generally awarded to the top 10% of medical students nationally). Following medical school, I gained post-graduate training through residencies with the Naval Hospital San Diego (surgery) and the University of Massachusetts Medical School (emergency medicine). In addition, I completed a two-year fellowship in medical toxicology at the University of Massachusetts Medical School in 2004. Medical toxicology is officially recognized as a medical subspecialty by the American Board of Medical Specialties. Physicians trained in medical toxicology provide professional services in a variety of clinical, industrial, educational, forensic, and public health settings.

I began my independent clinical career in the Department of Emergency Medicine at the University of Massachusetts Medical School in 2002. I was promoted to Assistant Professor of Emergency Medicine in 2004, and to Associate Professor in 2010. In addition, I currently serve as Program Director of the Emergency Medicine Residency Program and as Vice Chair of Education for the Department of Emergency Medicine at the University of Massachusetts Medical School. I work as an Attending Emergency Physician at the University of Massachusetts Medical Center, Marlborough Hospital, and Clinton Hospital. I am actively involved with numerous professional committees within the University of Massachusetts Medical School and its Department of Emergency

Medicine and Division of Medical Toxicology, and in national and international scientific organizations, such as the Society for Academic Emergency Medicine, the American College of Emergency Physicians, and the American College of Medical Toxicology. I serve on the Board of Directors of the Society for Academic Emergency Medicine and am currently the President of the Medical Staff of UMassMemorial Healthcare.

During my professional career, I have received a number of awards, including the Navy and Marine Corp Achievement Medal, the Society for Academic Emergency Medicine ("SAEM") Best Resident Basic Science Presentation Award, the SAEM New England Regional Research Directors Excellence in Research Award, and a Young Investigator Award from the Society for Academic Emergency Medicine.

I am an emergency physician and medical toxicologist, with a clinical and research focus on the toxicity of acetylcholinesterase inhibitors, and the clinical evaluation and treatment of exposures to these agents. In my clinical practice of medicine since 1995 and as a medical toxicologist, I have evaluated and treated several thousand patients with exposures, or possible exposures, to xenobiotics. I am a study section reviewer for the National Institutes of Health (NIH) and I have been the Principal Investigator on four grants from the U.S. National Institutes of Health totaling more than $4.8 million. My research is funded by the NIH CounterACT program – Countermeasures Against Chemical Threats. This program is aimed at ultimately developing medical therapies against chemical terrorist attacks. I have also been a lecturer for the American College of Medical Toxicology Agents of Opportunity course.

I am a reviewer for a number of scientific journals, including the *New England Journal of Medicine; JAMA; Annals of Emergency Medicine; Academic Emergency Medicine; Journal of Medical Toxicology; Clinical Toxicology; BMC Emergency Medicine*; and *Toxicology*. I have also served on the Editorial Board of *Academic Emergency Medicine* and the *Journal of Medical Toxicology*. I am certified by the American Board of Emergency Medicine and the American Board of Medical Toxicology. I currently hold a license to practice medicine in Massachusetts.

I am qualified to offer general and case-specific opinions regarding the toxicology of various chemical threats, including ricin. My general understanding of toxicology is based upon the length and scope of my graduate and post-graduate education, including the study of scientific methodology at Northwestern University, pre-clinical pharmacology and neurosciences as well as clinical courses at Northwestern, and the scope of my post-graduate training in medical toxicology at the University of Massachusetts Medical School. My ongoing study of medical toxicology continues with literature assessment and epidemiological analysis, including those instances where chemical agents are involved in exposure and toxicity.

CASE SUMMARY

Daniel Milzman is a 19 year-old Georgtown college student majoring in science. Based on information obtained over the Internet, on or about February 15, 2014, Daniel purchased products from local stores and was successful in producing about 123 milligrams of powder with a concentration of 7.7 micrograms of ricin per milligram of powder. Daniel produced this ricin in his college dormitory room and stored the produced substance in a plastic bag in his desk drawer. The substance remained in Daniel's desk for approximately one month. There was no delivery device of any kind found in Daniel's dorm room. Lastly, Daniel has been diagnosed with depression and had thoughts of suicide.

ANALYSIS AND DISCUSSION

Ricin is a protein isolated from the seeds of the castor bean plant (*Ricinus communis*). Ricin is a member of a group of ribosome-inactivating proteins that block protein synthesis in ribosomes. Ricin consisted of two polypeptide subunits chains (the A and B chains); the A chain is responsible for the toxicity. Castor beans have been used commercially for their oil (castor oil) and for their ornamental appearance.

Producing crude ricin is not difficult, and the methods are widely available on the Internet. Producing highly purified and biologically active ricin, however, is considerably more challenging.

The toxicity of ricin depends upon a number of important factors such as the animal species and strain in which it is tested (e.g.: mouse, rat, non-human primate); the method of delivery of the toxin (e.g.: oral ingestion, inhalation, intravenous, etc.); the concentration of the toxin; the amount of the toxin actually absorbed by the body after exposure; and the size of the ricin particles (if inhaled). The median lethal dose of ricin (that is the dose of ricin that kills 50% of exposed animals) varies greatly. For instance, in mice the aerosolized (which is likely the most sensitive and lethal means of ricin poisoning) LD_{50} is approximately 10 micrograms/kg, while in other animals the LD_{50} is more than 300 micrograms/kg. By ingestion, however, the LD_{50} in some mice is roughly 30 *milli*grams/kg – that is, it takes approximately 1000-times more ricin by the oral route to produce toxicity. Monkeys exposed to purified and inhaled ricin developed toxicity after receiving 21 to 42 micrograms/kg of very small (1- to 2-µmicron) particles. Larger particle sizes are considerably less toxic. Lastly, there is very little toxicity to ricin by the dermal exposure route.

The powder that Daniel Milzman produced in his dorm room was found to contain 0.7% ricin. However, I am aware of no testing that determined the particle size of this very crude and impure substance, or that this crude substance was biologically active. Furthermore, even if the small concentration of ricin were biologically active, such a low biologically active concentration of ricin (with a total quantity of approximately 900 micrograms) would require the entire mass of substance (123 milligrams) to be either directly injected intravenously to pose a potentially serious or lethal exposure. These facts make the nefarious use of the substance allegedly produced by Daniel Milzman unfeasible. This fact is highlighted by the fact that all animal studies of ricin toxicity employ highly concentrated and pure ricin toxin. A crude and exceedingly low

concentration of ricin similar to which Daniel Milzman allegedly made in his dorm room, has not been used previously in animal toxicity studies.

A last important point to consider in this case is that there was no delivery device found in Daniel Milzman's dorm room. To effectively cause toxicity in a human, there must be some effective means of delivering the dose of ricin, particularly as the dermal (skin) exposure of the substance found in Milzman's dorm room would cause no toxicity. Due to the likely large particle size of the crude substance, it would likely cause little toxicity, even assuming that the entire 123 milligrams of the substance could be delivered to the lungs (which is an impossible proposition). Lastly, there was no device to deliver the entire 123 milligrams intravenously or intrasmuscularly, which again, is an improbable or impossible method of poisoning with the substance found in his dorm room.

SUMMARY AND OPINION

Based upon available records, my education, my training, and my experience, I hold the following opinions to within a reasonable degree of medical certainty: 1) that the ricin-containing product allegedly produced by Daniel Milzman was of insufficient quality and/or quantity to be lethal by an inhalational route; 2) that the ricin-containing product allegedly produced by Daniel Milzman was of insufficient quality and/or quantity to be lethal by the oral ingestion route; 3) that the ricin-containing product allegedly produced by Daniel Milzman was of insufficient quality and/or quantity to be lethal if injected intravenous or intramuscular routes; 4) that studies examining the toxicity of ricin in animal studies (generally rodents) used highly purified ricin toxin in highly controlled experiments, which do not remotely mimic the potential human exposure to the substance found in Milman's dorm room.

CLOSING

Please call me if you have any questions. I can be reached at home [redacted], by cell phone [redacted], or e-mail [redacted].

Steven B. Bird, MD, FACEP, FACMT

ANNE-MICHELLE RUHA, MD
[redacted]

Fellow, American College of Medical Toxicology
Member, American Academy of Clinical Toxicology
Diplomate, American Board of Emergency Medicine
Board Certification in Medical Toxicology

July 14, 2014

Dear Mr. Onorato,

I am a board-certified physician medical toxicologist. I have reviewed the complaint against Daniel Harry Milzman and offer the following professional opinion regarding the potential human toxicity of the substance that was in his possession:

Mr. Milzman was in possession of 123 mg of a powdered substance that he had extracted from castor beans. According to the government affidavit, the amount of toxin (ricin) within the substance was 7.7 micrograms/mg. This indicates the total amount of ricin within the powdered substance was 947 micrograms (0.947 mg).

Ricin is a natural component of castor bean seeds. Although the amount of ricin within a single seed may vary, the amount typically reported is between 1 and 5%. The powdered substance Mr. Milzman was in possession of contained less than 1% ricin. It therefore contained less ricin than would be expected to be found in ground-up castor bean seeds.

Ricin, as a component of the castor bean seed, is commonly ingested. Although patients who intentionally chew many seeds (thus releasing the ricin) may experience gastrointestinal effects, serious poisoning is uncommon. A recent review of 84 patients reported to US poison centers with ingestion of castor bean seeds reported no serious outcomes or deaths.

Ricin is most dangerous in its purified form. Pure ricin injected into the body with a needle can be lethal. To my knowledge there are no reports of poisoning from ingestion of pure ricin in human beings. Weaponized ricin is a purified and inhalable preparation, which is not the form described to have been possessed by Mr. Milzman in the government affidavit.

In summary, the substance possessed by Mr. Milzman, which was reported to have contained less than 1% ricin, was far from the purified form of the toxin which is considered highly lethal and dangerous. If the entire 123 mg of castor bean extract possessed by Mr. Milzman had been ingested, it is unclear that any toxicity would have ensued.

ANNE-MICHELLE RUHA, MD
[redacted]

My conclusions are:

1. The castor bean extract possessed by Mr. Milzman possessed less ricin than would be expected in a similar amount of castor beans.
2. If Mr. Milzman had ingested the substance in its entirety it is unlikely he would have experienced any toxic effects.
3. If Mr. Milzman had injected the substance it is unclear if he would have experienced any toxicity related to the ricin component.
4. The substance possessed by Mr. Milzman was neither purified nor weaponized, it was not in an aerosolized form expected to pose an inhalation risk, and was not a threat to the general public.

Sincerely,

Anne-Michelle Ruha, MD
Board Certified Medical Toxicologist
Fellow, American College of Medical Toxicology
Associate Professor, University of Arizona College of Medicine